Operator's Manual

ASCO® Series 200 Automatic Transfer Switching Equipment D–design 30 through 230 amperes

⚠ DANGER

DANGER is used in this manual to warn of a hazard situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING is used in this manual to warn of a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION is used in this manual to warn of a hazardous situation which, if not avoided, could result in minor or moderate injury.

Note: Refer to the outline and wiring drawings provided with your Series 200 ATSE for all installation and connection details and accessories.

Nameplate / rating Label

The Series 200 Automatic Transfer Switching Equipment (ATSE) contains a nameplate / rating label which includes data for that specific ATSE. It defines the loads and fault circuit withstand/closing ratings. Refer to the labels on the Transfer Switching device for specific values and use the ATSE only within their limits.

An experienced licensed electrician should install the ATSE.

⚠ WARNING

Do not exceed the values on the rating label. Exceeding the rating can cause person injury or serious equipment damage.

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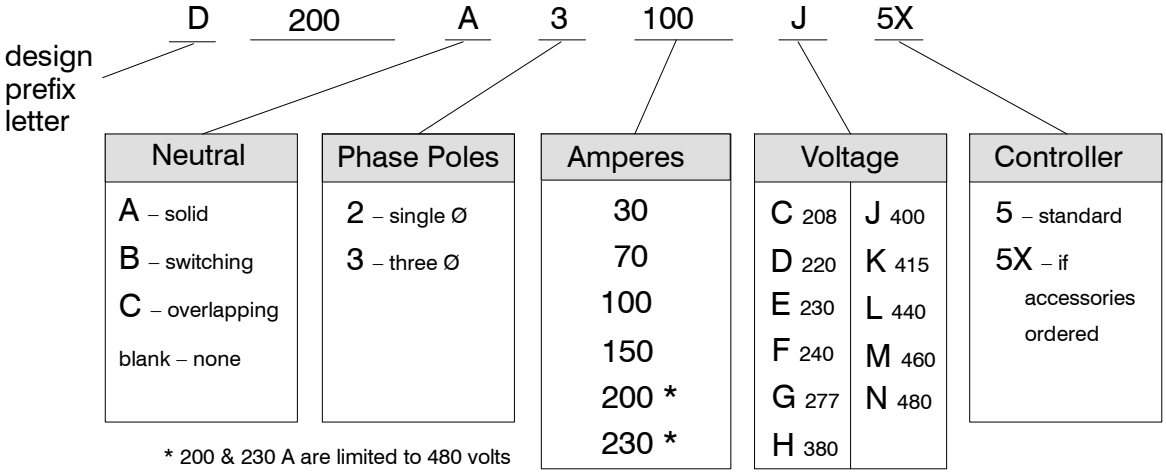
A typical Catalog Number is shown below with its elements explained:

Catalog Number Identification

Typical D–design Series 200 ATS catalog no. for a solid neutral, 3 pole, 100 amp, 400 V, open type:



SECTION 1 INSTALLATION

The ASCO Series 200 automatic transfer switching equipment (ATSE) consists of a transfer switching device, monitoring and transfer control device (controller), and membrane controls (for door mounting). The ATSE is factory tested. Installation requires mounting the devices into an appropriate size enclosure and connection of power conductors, engine start signal wires, and auxiliary circuits.

Mounting

The *Outline and Mounting Diagram* furnished with the ATSE shows all mounting details and instructions.

NOTICE

Protect the automatic transfer switching equipment from construction grit and metal chips to prevent malfunction or shortened life of the transfer switching device.

Mount the transfer switch vertically in the back of the enclosure as shown on the *Outline and Mounting Diagram* provided. Level all mounting points of the rigid supporting structure by using flat washers behind the holes to avoid forced distortion of the transfer switch.

Mount the membrane controls and the controller on the inside of the enclosure door as shown on the *Outline and Mounting Diagram* provided. The membrane controls must be accessible through a cutout in the door. Connect the membrane controls to the right side of the controller with the ribbon cable provided. Then connect the transfer switching device harness plugs to the left side of the controller. See Figures 1–1 and 1–2.

An add-on rail is provided for some optional accessories. If provided, mounted it below the controller. Then make the connections shown on the *Wiring Diagram*.

Grounding

Grounding (earthing) is accomplished by mounting the automatic transfer switching equipment in a metal enclosure. Connect the control panel grounding wire (lower left side) to equipment (enclosure or clean earth) ground. This wire can be connected to the controller's lower left mounting stud. Because the controller is mounted on a door, a conductive strap must be used between the enclosure and the door. This connection provides proper grounding which does not rely upon the door hinges. See Figure 1–3.

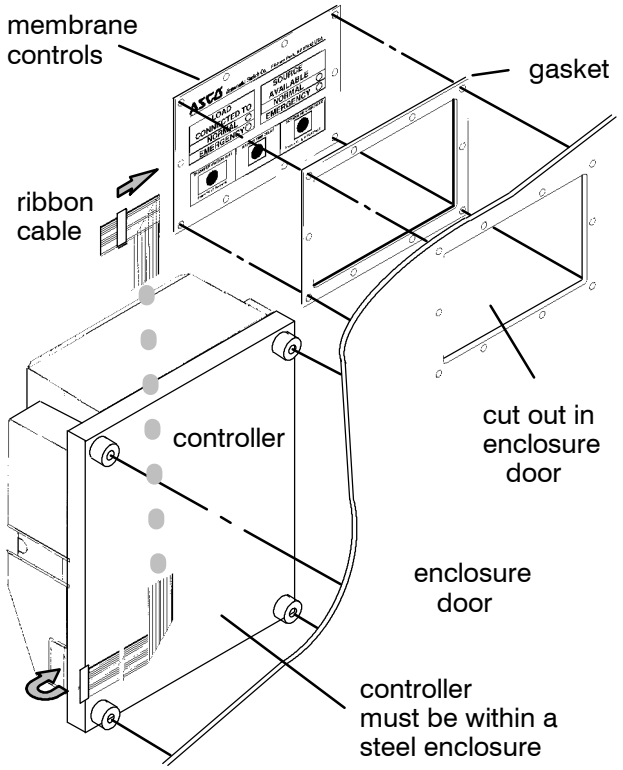


Figure 1-1. Membrane controls and controller mounting on inside of enclosure door. Refer to *Outline & Mounting Diagram* for mounting hardware.

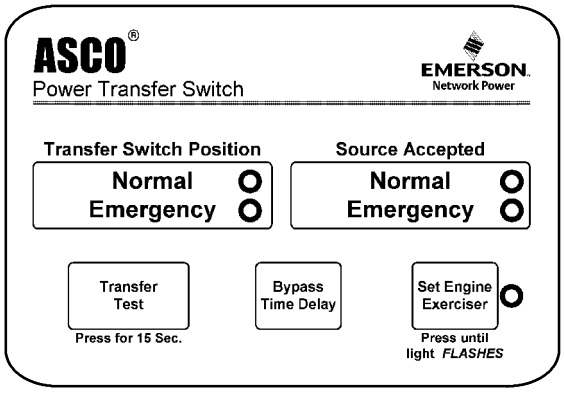


Figure 1-2. Membrane controls with gasket suitable for IP65 enclosure.

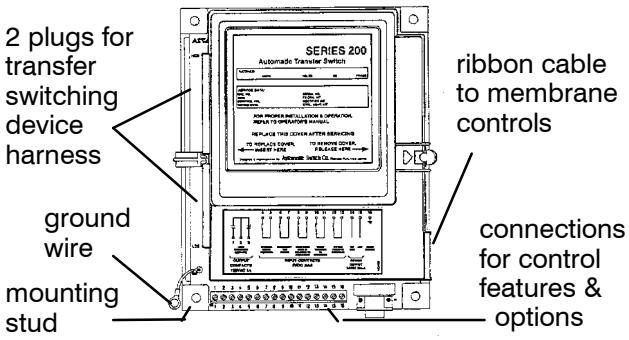


Figure 1-3. Controller grounding (clean earth) wire and other connections.

NOTICE

The controller must be grounded for proper operation.

⚠ DANGER

De–energize the conductors before making any line or auxiliary circuitry connections. Be sure that Normal and Emergency line connections are in proper phase rotation. Place engine generator starting control in the OFF position. Make sure engine generator is not in operation.

Power connections

A *Wiring Diagram* is furnished with the Series 200 ATSE. All wiring must be made in accordance with the local codes.

Do not run cables in front of the transfer switching device. Conductors can be bundled on the right side of the transfer switching device. Maintain proper electrical clearance between the live metal parts and grounded metal: 13 mm minimum.

It is not necessary to remove the barriers from the transfer switching device to install the conductors. If you do remove them, however, be sure to reinstall the barriers carefully.

Connect main source and load conductors to clearly marked power terminals on the transfer switching device. Be careful when stripping insulation from the conductors; avoid nicking or ringing the conductor. Remove surface oxides from conductors by cleaning with a wire brush. Follow conductor manufacturer's instructions when aluminum conductor is used. Apply joint compound to conductor, then carefully wipe away excess compound. Tighten the terminals to the torque specified on the label on the transfer switching device.

Three conductor spacers are included with 150, 200, and 230 ampere transfer switching devices. When installing power conductors, run them through the conductor spacers as shown in Figure 1–4. Position the spacers within 38 mm of the power terminals.

NOTICE

Three conductor spacers must be located as shown for 150, 200, and 230 ampere transfer switching devices.

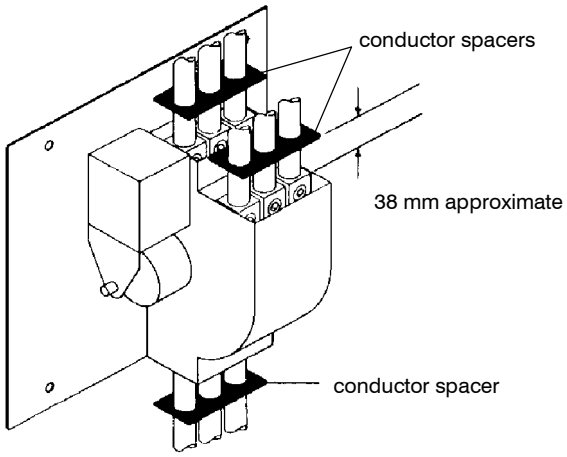


Figure 1-4. Required conductor spacers for 150, 200, & 230 amp transfer switching devices.

Engine Starting Contacts

The engine control contact connections (if used) are located on the transfer switching device. Connect signal wires to appropriate terminals as specified in Table A and shown in Figure 1–5.

Table A. Engine start connections

When normal source fails	Terminals on transfer switching device
contact closes	TB1 and TB2
contact opens	TB1 and TB3

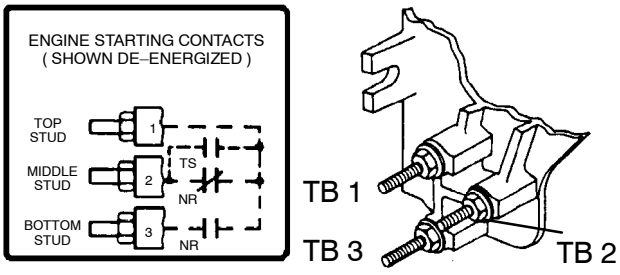


Figure 1-5. Engine starting contact label and location on left side of transfer switching device.

Interconnecting harness

Connect the plug–in harness (two plugs) from the transfer switching device to left side of the controller, if not already connected.

Auxiliary Circuits

Connect auxiliary circuit wires (if necessary) to appropriate terminals by referring to the *Wiring Diagram*.

Functional Test

The **Functional Test** consists of three checks: manual operation, voltage checks, and electrical operation.

NOTICE

Do these checks in the order presented to avoid damaging the automatic transfer switching equipment.

Read all instructions on the *Wiring Diagrams* and labels affixed to the ATS. Note the control features that are provided and review their operation before proceeding.

1 – Manual Operation

A detachable manual operator handle is provided on the Transfer Switching device **for maintenance purposes only**. Manual operation of the transfer switching device must be checked before it is operated electrically.

⚠ WARNING

Do not manually operate the transfer switching device until both power sources are disconnected: open both circuit breakers.

1. After deenergizing both power sources, open the enclosure door. Locate and the maintenance handle on the left side of the transfer switching device. See Figure 1–6.
2. Grasp the attached maintenance handle and turn it with thumb and fingers as shown to manually operate it. The maintenance handle turns the opposite direction of the weight. Turn it up or down as shown to manually operate the transfer switching device. It should operate smoothly without any binding. If it does not, check for shipping damage or construction debris.
3. Return the transfer switching device to the *N* (normal) position.

Now continue to **2 – Voltage Checks** on next page.

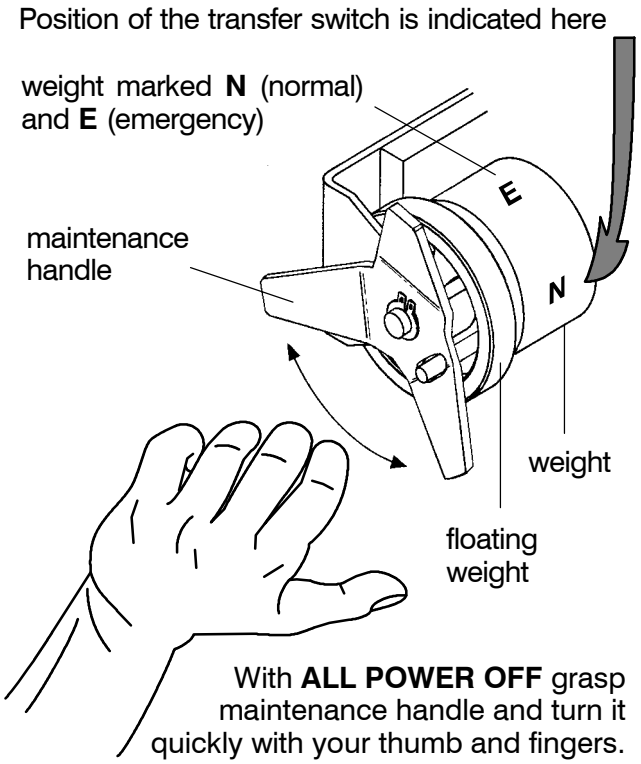


Figure 1-6. Maintenance handle and positions.

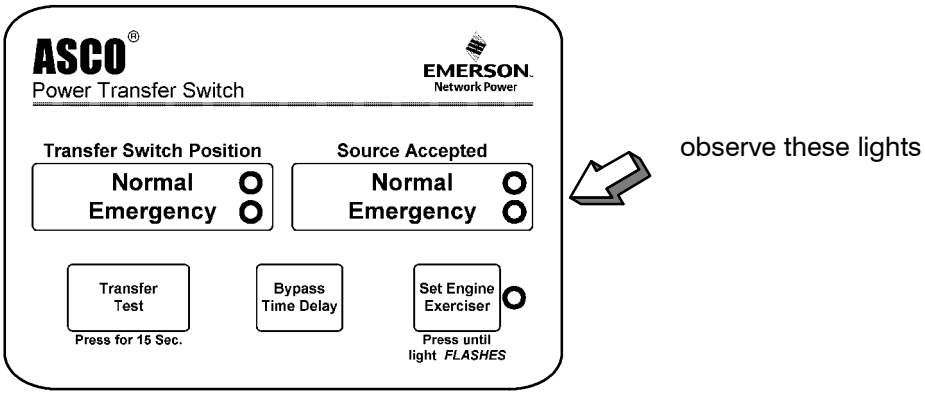


Figure 1–7. Standard controls and indicators.

2 – Voltage Checks

First check nameplate on transfer switching device; rated voltage must be the same as normal and emergency line voltages.

⚠ DANGER

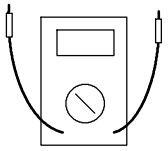
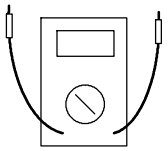
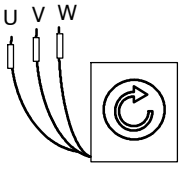
Use extreme caution when using a meter to measure voltages in the following steps. Do not touch power terminals; shock, burns, or death could result !

Perform steps 1 through 6 at the right. Observe the status lights. See Figure 1–7.

- ● Black circle means light is on.
- ❍ White circle means light is off.

* If necessary, adjust voltage regulator on the generator according to the manufacturer's recommendations. The Automatic Transfer Switching Equipment will respond only to the rated voltage specified on the Transfer Switching device nameplate.

Also see page 4–1 for the HI–LOW voltage adjust setting in the controller. The LOW setting shifts all voltage settings down 4.2%; for example, 240 V to 230 V.

1	Close the normal source circuit breaker. The *Normal Transfer Switch Position* and the *Normal Source Accepted* lights should come on.	Source Accepted Normal ● Emergency ○
2	Use an accurate voltmeter to check phase to phase and phase to neutral voltages present at the transfer switching device normal source terminals.	
3	Close the emergency source circuit breaker. (Start generator, if necessary.) The *Emergency Source Accepted* light should come on.	Source Accepted Normal ● Emergency ●
4	Use an accurate voltmeter to check phase to phase and phase to neutral voltages present at the transfer switching device emergency source terminals.*	
5	Use a phase rotation meter to check phase rotation of emergency source; it must be the <u>same</u> as the normal source.	
6	Shut down the engine–generator, if applicable. The *Emergency Source Accepted* light should go off. Then put the starting control selector switch (on the generator set) in the *automatic* position. Close enclosure door.	Source Accepted Normal ● Emergency ○

Now continue to **3 – Electrical Operation** on next page.

observe these lights

press this button

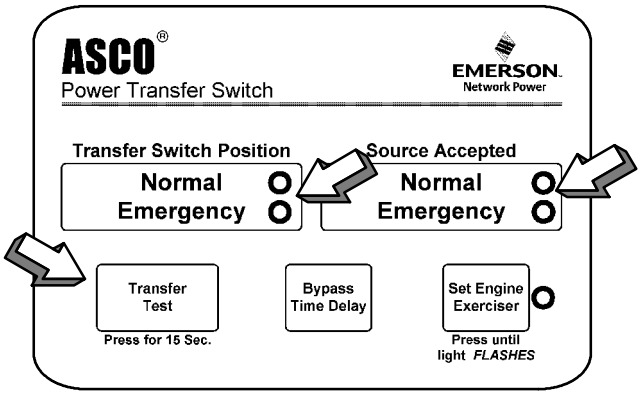


Figure 1–8. Standard controls and indicators.

3 – Electrical Operation

This procedure will check the electrical operation of the Automatic Transfer Switching Equipment.

⚠ WARNING

Close the automatic transfer switching equipment enclosure door and tighten the screws before you test electrical operation.

Transfer Test

Both normal and emergency sources must be available and the emergency source generator (if used) must be capable of being started in this procedure.

Perform steps 1 through 8 at the right. Observe the status lights. See Figure 1–8.

- ● Black circle means light is on.
- ❍ White circle means light is off.

NOTE: If Motor Load Transfer feature is activated, then transfer may not occur immediately after the respective time delays. Transfer will only occur when the phase relationship between sources is correct.

NOTE: The operating transfer time of the transfer switching device is 0,17 second maximum, which is measured from the time that power is applied to the operating coil of the transfer switching device until the main contacts close on the alternative source.

This completes the Functional Test of the ASCO Series 200 Automatic Transfer Switching Equipment. Leave the engine–generator starting control in the *automatic* position.

1	The normal source must be available and the generator must be ready to start. Check that the *Normal Source Accepted* light is on.	Source Accepted Normal ● Emergency ○
2	Press and hold the *Transfer Test* button until the engine starts and runs. This should happen within 15 sec.	Transfer Test
3	The *Emergency Source Accepted* light should come on.	Source Accepted Normal ● Emergency ●
4	The transfer switching device should transfer to the Emergency position. The *Emergency Transfer Switch Position* light should come on and the *Normal* light should go off.	Transfer Switch Position Normal ○ Emergency ●
5	If the *transfer to emergency delay* is used the transfer should occurs after a time delay (up to 5 minutes). For immediate transfer press the *Bypass Time Delay* button.	Bypass Time Delay
6	The transfer switching device should transfer back to the Normal position. The *Normal Transfer Switch Position* light should come on and the *Emergency* light should go off.	Transfer Switch Position Normal ● Emergency ○
7	If the *retransfer to normal delay* is used the retransfer should occur after a time delay (up to 30 minutes). For immediate retransfer press the *Bypass Time Delay* button.	Bypass Time Delay
8	The *unloaded running delay* keeps the generator running for 5 minutes (cool–down period). Then the generator should stop and the *Emergency Source Accepted* light should go off.	Source Accepted Normal ● Emergency ○

SECTION 2 SEQUENCE OF OPERATION

Transfer To Emergency

The sequence for load transfer to emergency source begins automatically when normal source voltage falls below the preset dropout point or when *Transfer Test* button is pressed. An under voltage condition on any phase of the normal source is detected by the sensor.

When the normal source voltage fails or the *Transfer Test* button is pressed, the SE relay de-energizes and relay NR begins its timing cycle (1 or 3 seconds, *momentary normal source outage delay*). The NR relay is provided with a time delay on dropout to override momentary outages and prevent nuisance starting of the engine-driven generator. If the normal source voltage returns above the sensor dropout setting before the time delay expires, the NR relay timing cycle is reset to zero and relay SE energizes.

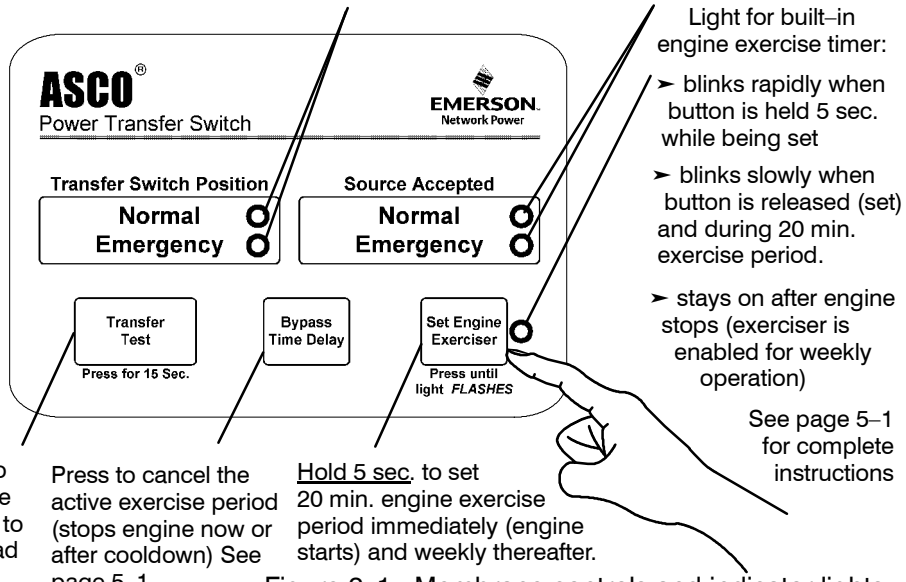


Figure 2–1. Membrane controls and indicator lights.

If the normal source voltage does not return above the sensor dropout setting before the time delay expires, the NR relay de-energizes and signals the engine-driven generator to start. At the same time, a voltage and frequency sensor begins monitoring the emergency source. The sensor will accept the emergency source only when both voltage and frequency reach preset pickup points. Usually about ten seconds elapse from dropout of the NR relay to acceptance by the sensor. This time span occurs because the engine-driven generator must crank, start, and run up to nominal pickup points. For this reason, if the *Transfer Test* button is pressed it must be held for 15 seconds. If the emergency source is available immediately, the sensor may accept it as soon as NR relay drops out.

When the emergency source is accepted by the sensor, relay ER begins its timing cycle (*transfer to emergency delay*). ER relay is provided with an adjustable (0 to 5 minutes) time delay on pickup to delay transfer of the load to the emergency source. For immediate transfer press *Bypass Time Delay* button.

ER relay energizes, the TS coil is energized, the transfer switching device operates, and all switch contacts (mains, controls, auxiliaries) reverse position. The transfer switch is now supplying the load from the emergency source.

The transfer switching device will remain in the Emergency position until the normal source is restored. If the *Transfer Test* button is used, the transfer switching device will remain on emergency until the *retransfer to normal delay* times out.

Retransfer to Normal

The sequence for load retransfer to the normal source automatically begins when the voltage sensor detects restoration of the normal source. The voltage level must rise above the preset pickup point on all phases before the sensor will accept the normal source.

When the normal source is accepted by the sensor, relay SE begins its timing cycle (adjustable 1 sec. to 30 min., *retransfer to normal delay*). For immediate retransfer press *Bypass Time Delay* button. SE relay is provided with a time delay on pickup to prevent immediate load retransfer to the normal source. The delay insures that the normal source has stabilized before reconnection of vital loads. If the normal source voltage falls below the present dropout point before the time delay expires, the timing cycle is reset to zero. If the emergency source fails for more than 4 seconds during the timing cycle, ER relay drops out and the load is immediately retransferred to the normal source, if that source is acceptable.

SE relay energizes and ER relay is dropped out. The TS coil is energized, the transfer switching device operates, and all switch contacts (mains, controls, auxiliaries) reverse position. The transfer switching device is now supplying the load from the normal source again.

Upon retransfer to the normal source, NR relay begins its timing cycle (*unloaded running delay [engine cool-down]*). NR relay is provided with a 5 minute time delay on pickup to keep the engine running for a cool-down period.

NR relay energizes after the time delay and signals the engine-driven generator to shut down. All circuits are reset for any future normal source failure.

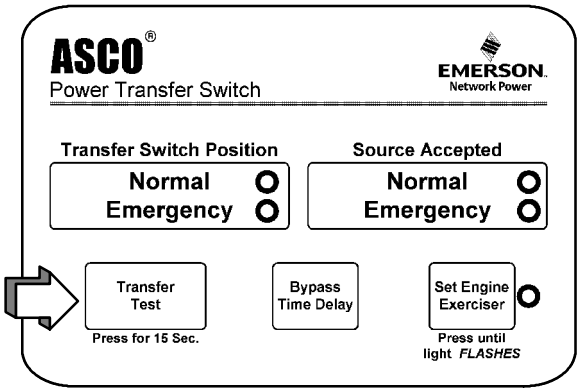
Activation of standard control features shown in Section 5 will alter the sequence of operation and introduce additional time delays during transfer operations.

SECTION 3 TESTING & SERVICE

PREVENTIVE MAINTENANCE

Reasonable care in preventive maintenance will insure high reliability and long life for the automatic transfer switch.

Operate the switch at least once a month. Perform this four step Electrical Operation Test. This is a test with load transfer.



Transfer Switch Test

1.	Press and hold the door-mounted *TRANSFER SWITCH TEST* button until the engine starts and runs. This should happen within 15 seconds.
2.	The transfer switching device will operate to the Emergency position. If the *Transfer To Emergency Delay* is used, the transfer will occur after a time delay (up to 5 minutes). For immediate transfer press *BYPASS TIME DELAY* button.
3.	The transfer switching device will operate back to Normal position after the *Retransfer To Normal Delay* (up to 30 minutes). For immediate retransfer press *BYPASS TIME DELAY* button.
4.	*Unloaded Running (Engine Cooldown) Delay* allows engine to run unloaded for 5 minutes.

Clean and inspect the switch once a year. De-energize all sources, then brush and vacuum away any excessive dust accumulation. Remove the transfer switch barriers and check contact condition. The non–replaceable main contacts are designed to last the life of the transfer switch. Reinstall the barriers carefully.

Maintain transfer switch lubrication. The transfer switch has been properly lubricated, and under normal operating conditions no further lubricating is required. Renew factory lubrication if the switch is subjected to severe dust or abnormal operating conditions. Relubricate the solenoid operator if a coil is replaced. Do not use oil. Order **lubrication 625550–001** (Castrol *Endurex*® 4000 lubricant).

Replacement parts. Replacement parts are available in kit form. When ordering parts provide the Serial No. and Catalog No. from the transfer switch nameplate. Contact your local ASCO Power Technologies sales office.

DISCONNECTING THE CONTROLLER

The harness disconnect plugs are furnished for repair purposes only and should not have to be unplugged. If the controller must be isolated, follow these steps carefully.

Disconnecting the Plugs

1. Observe the position of the transfer switching device.
   a. If the transfer switching device is in the *Normal* position, place standby engine starting control in the *off* position. Then open the emergency source circuit breaker.
   b. If the transfer switching device is in the *Emergency* position, open the normal source circuit breaker. Place the engine starting control in the *test* or *run* position.
2. Separate the quick disconnect plugs by squeezing the latches. Do not pull on the harness wires.
3. Label, remove, and tape the signal wires connected to the engine start terminals on the transfer switching device: TB1 and TB3, or TB1 and TB2.

Reconnecting the Plugs

1. Observe the position of the transfer switching device.
   a. If the transfer switch is in the *Normal* position, be sure that the standby engine starting control is still in the *off* position. The emergency source circuit breaker still should be open.
   b. If the transfer switch is in the *Emergency* position, normal source circuit breaker still should be open.
2. Reconnect the signal wires connected to the appropriate engine start terminals on the transfer switch. See **Section 1**, *Engine Starting Contacts*.
3. The harness plugs and sockets are keyed. Carefully align the plugs with the sockets and press straight in until both latches click.
4. Restore the opposite source as follows:
   a. If the transfer switch is in the *Normal* position, place the standby engine starting control in the *automatic* position. Then close the emergency source circuit breaker.
   b. If the transfer switch is in the *Emergency* position, close the normal source circuit breaker. The load will be automatically retransferred to the normal source after the *Retransfer to Normal Delay*. For immediate retransfer, press *BYPASS TIME DELAY* button. Place the engine starting control in the *automatic* position.

MANUAL LOAD TRANSFER

This procedure will manually transfer the load if the controller is disconnected.

⚠ WARNING

Do not manually operate the transfer switching device until both power sources are disconnected: open both circuit breakers.

1. Open normal and emergency source circuit breakers.
2. Use the maintenance handle to manually operate transfer switching device to the opposite source. See page 1–4, *Manual Operation Test*.
3. If the transfer switching device is in the Emergency position manually start the engine generator and then close the emergency source circuit breaker.

TROUBLE-SHOOTING

Note the control features that are activated or furnished on the switch and review their operation. Refer to **Section 5**, **Control Features**.

⚠ WARNING

Proceed with care! The automatic transfer switching equipment is energized.

Table 3-1. Trouble-Shooting Checks.

PROBLEM	CHECK IN NUMERICAL SEQUENCE		
	1 OPERATION	2 GEN-SET	3 VOLTAGE
Gen-Set does not start when the *TRANSFER SWITCH TEST* button is pressed and held for 15 seconds or when the normal source fails.	Hold the *TRANSFER SWITCH TEST* button 15 sec. or the outage must be long enough to allow for the 1 or 3 sec. *Momentary Normal Source Outage Delay* plus engine cranking and starting time.	Starting control must be in automatic position. Batteries must be charged and connected. Check wiring to engine starting contacts.	—
Transfer switching device does not transfer the load to emergency source after the gen-set starts.	Wait for *Transfer to Emergency Delay* (0 to 5 min.) to time out. For immediate transfer, press the *BYPASS TIME DELAY* button. If Motor Load Transfer is active, wait for in-phase condition (see below).	Generator output circuit breaker must be closed. Generator frequency must be at least 95% of nominal (48 Hz for a 50 Hz system).	Voltmeter should read at least 90% of nominal phase to phase voltage between transfer switch terminals U2 and W2 (or L1 and L5 for 2 pole switches). * * These are factory settings.
Transfer switching device does not transfer the load to normal source when normal returns or when *TRANSFER SWITCH TEST* button is released.	Wait for *Retransfer to Normal Delay* (1 sec. to 30 min.) to time out. For immediate re–transfer, press *BYPASS TIME DELAY* button. If Motor Load Transfer is active, wait for in-phase condition (see below).	—	Voltmeter should read at least 90% of nominal phase to phase voltage between transfer switching device terminals V1 and W1, W1 and U1, and U1 and V1 (or L2 and L6 for 2 pole switches).
Gen-Set does not stop after load retransfer to the normal source.	Wait for the 5 minute *Unloaded Running Delay* to time out.	Starting control must be in automatic position.	—

Trouble-Shooting the Motor Load Transfer Feature (refer to page 5–3)

⚠ DANGER

Use extreme caution when using a meter to measure voltages in the following steps. Do not touch power terminals; shock, burns, or death could result !

1. Connect a voltmeter (set for twice system phase–to–phase voltage) between transfer switching device terminals U1 and U2 (for 3 pole) or L1 and L2 (for 2 pole).
2. Manually start generator. Voltmeter needle should sweep back and forth at a regular rate between 0 and about twice system voltage.
3. Press and hold the **Transfer Test** button. The load should transfer to emergency source when meter needle is near 0 volts. If transfer does not occur, Motor Load Transfer feature is not operating.
4. Release the **Transfer Test** button. The load should retransfer back to the normal source after the *Retransfer to Normal Delay*, if used. The retransfer should occur when the needle is near 0 volts. If retransfer does not occur after the time delay, the Motor Load Transfer feature is not operating.
5. For immediate retransfer, press the **Bypass Time Delay** button. Then disconnect the voltmeter.

If the problem is isolated to circuits on the controller or the transfer switching device, call your local ASCO Power Technologies sales office. Furnish Serial No., Bill of Material (BOM) No., & Catalog No. from the transfer switching device nameplate.

SECTION 4 ADJUSTMENTS

Time Delay Adjustment

Standard time delays are set to customer specifications (if none specified, standard factory settings are used).

To change a setting, follow procedure on page 4-2. Use Table 4-1 as a guide to time delay values and their corresponding adjustment DIP switch or potentiometer.

Table 4-1. Time Delay Settings

DESCRIPTION	LABELS	FACTORY SETTING	ADJUSTMENT RANGE	S3 DIP SWITCH		ADJUSTMENT POTENTIOMETER
Override Momentary Normal Source Outages	TD ES	3 seconds	1 second	Actuator 1 on		—
			3 seconds	Actuator 1 off		
Transfer to Emergency	TIMER N/E	0 minutes (full ccw)	0 to 5 minutes	—	—	P2
Override Momentary Emergency S. Outages	—	4 seconds	non-adjustable	—	—	—
Retransfer to Normal	TIMER E/N	30 minutes (full cw)	1 second to 30 minutes	—	—	P1
Unloaded Running (Engine Cooldown)	—	5 minutes	non-adjustable	—	—	—

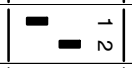
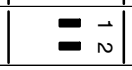
Sensor Adjustments

Voltage and frequency sensor pickup and dropout points are set to customer specifications (if none specified, standard factory settings are used). To change a setting, follow procedure on page 4–2. Use Tables 4-2 and 4–3 for settings and corresponding DIP switch actuators.

NOTICE

Any change in these settings may affect the normal operation of the automatic transfer switching equipment. This change could allow the load circuits to remain connected to a low voltage source.

Table 4-2. Voltage and Frequency Settings. (☐ Shaded DIP switches are standard factory settings).

DESCRIPTION	LABELS	SETTING	% of nominal		S1 DIP SWITCH	
			FACT. SET	ADJ RANGE		
Normal Source Voltage	PU / N	Pickup	90 %	95 % *	Actuator 3 off	
				90 %	Actuator 3 on	
	DO / N	Dropout	85 %	90 % *	Actuator 1 off Actuator 2 off	
				85 %	Actuator 1 on Actuator 2 off	
				80 %	Actuator 1 off Actuator 2 on	
				70 %	Actuator 1 on Actuator 2 on	
Emergency Source Voltage	– –	Pickup	90 %	non-adjustable	– –	
	– –	Dropout	75 %	non-adjustable		
Emergency Source Frequency	– –	Pickup	95 %	non-adjustable	– –	
	– –	Dropout	85 %	non-adjustable		
	60 / 50 Hz	60 / 50 Hz	60 Hz	60 Hz	Actuator 4 off	
				50 Hz	Actuator 4 on	
Voltage Phases	3 ∅ , 1 ∅	3 ∅ / 1 ∅	3 ∅	3 phase	Actuator 6 off	
				1 phase	Actuator 6 on	

* If dropout voltage is set to 90%, the pickup voltage must be set to 95%.

Table 4-3. Transformer Voltage Adjust.
(Low setting shifts all voltage settings down 4.2%; for example, 240 V to 230 V, or 480 V to 460 V)

DESCRIPTION	LABELS	FACTORY SETTING	ADJUSTMENT	S3 DIP SWITCH	
Voltage Adjust (4.2%)	LOW / HI	HI	LOW	Actuator 2 off	
			HI	Actuator 2 on	

NOTICE

Do not make any setting changes while the controller is energized.

How to Change a Setting

1. Prevent the transfer switching device from operating by disconnecting one source first, then the other, as follows:
   a. If the transfer switching device is in the Normal position, open the emergency source circuit breaker. Turn the engine starting control to *off*. Then open the normal source circuit breaker.
   b. If the transfer switching device is in the Emergency position, open the normal source circuit breaker. Turn engine starting control to *test* or *run*. Then open the emergency source circuit breaker.
2. Disconnect both harness plugs from controller by squeezing the latches. Do not pull on the wires.
3. Remove cover from the controller by releasing latch on right side with your thumb. See Figure 4-1.
4. Locate the appropriate adjustment potentiometer or DIP switch for the setting that you want to change. Refer to Table 4-1 and Table 4–2 on page 4-1 and Figure 4-2, Figure 4–3, Figure 4–4 on page 4–2.
5. Use a small screwdriver to turn the potentiometer clockwise to increase the time delay or counterclockwise to decrease it. See Figure 4-3.
6. Use a ball-point pen (or similar pointed tool) to slide the switch actuators left or right so they match the illustration next to the setting (left = off, right = on). Recheck the setting. See Figure 4-4.
7. Install the cover on the controller by hooking it on the left side and latching the right side.
8. Reconnect both harness plugs to the controller by aligning and pressing straight in until latches click.

⚠ WARNING

Close the automatic transfer switching equipment enclosure door and tighten the screws before restoring power.

9. Close the enclosure door, then restore both sources:
   a. If the transfer switching device is in the Normal position first close the normal source circuit breaker, then close the emergency source circuit breaker.
   b. If the transfer switching device is in the Emergency position, close the normal source circuit breaker. The load will be automatically retransferred to the normal source. Then close the emergency source circuit breaker.
10. Turn the engine starting control to *automatic*.

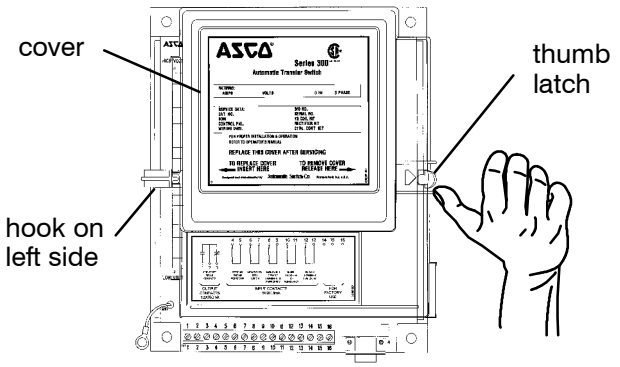


Figure 4-1. Controller cover latch.

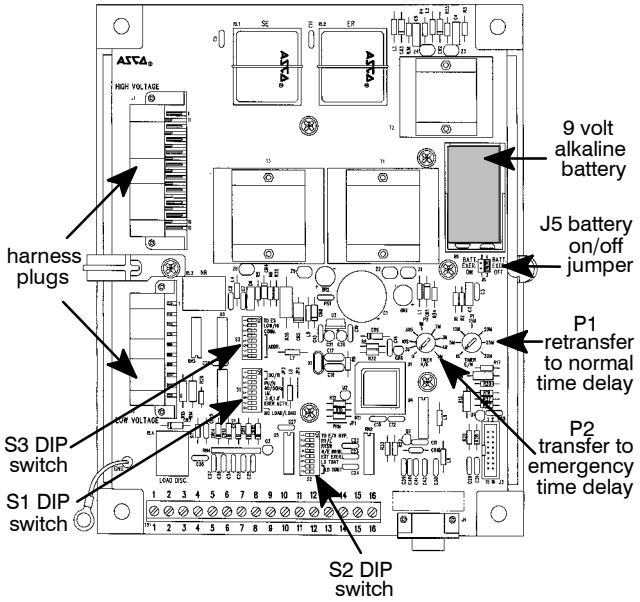


Figure 4-2. Location of potentiometers, DIP switches, battery, and battery jumper.

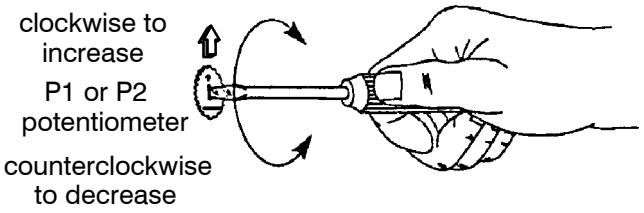


Figure 4-3. Changing time delay potentiometers.

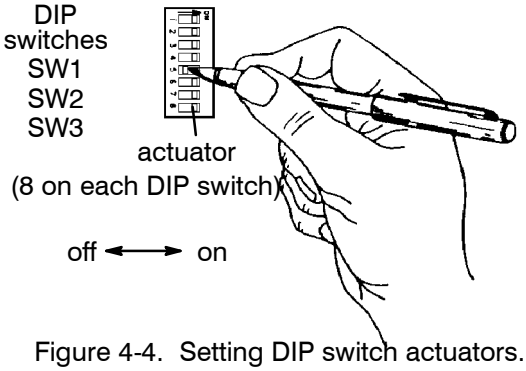


Figure 4-4. Setting DIP switch actuators.

SECTION 5 CONTROL FEATURES – ENGINE EXERCISERS

These timers periodically exercise the emergency engine-generator plant. They can be set to exercise with or without load transfer, or they can be completely disabled. The engine-generator should be exercised under load once a week for a minimum time period of 20 minutes, or follow the recommendations of the engine-generator set manufacturer. Refer to page 4–2 for location of DIP switches, battery (provided), and jumper block in the controller.

BUILT–IN ENGINE EXERCISER

The engine exerciser included in the Series 200 automatic transfer switching device provides a once a week 20–minute exercise period. It occurs immediately when the SET ENGINE EXERCISER push button is pressed (and held for at least 5 seconds), and then at the same time weekly thereafter. A 9 volt alkaline battery (*Duracell*® MN1604, *Everready*® 522, or *Panasonic*® 6AM6) is furnished and installed in the controller to maintain the setting. The battery jumper block must be shifted to the ON position. See Figure 4–2 on page 4–2.

Fill in day and time set. Week Day _____ Time _____.

DIP Switch Settings

FUNCTION	S1 DIP SWITCH		S2 DIP SWITCH	
Std. Timer Enabled	Actuator 7 on	7	Actuator 5 on	5
Std. Timer Disabled	Actuator 7 off	7	Actuator 5 on	5
Exercise without Load	Actuator 8 off	8		
Exercise with Load	Actuator 8 on	8		

Shaded DIP switches are standard factory settings.

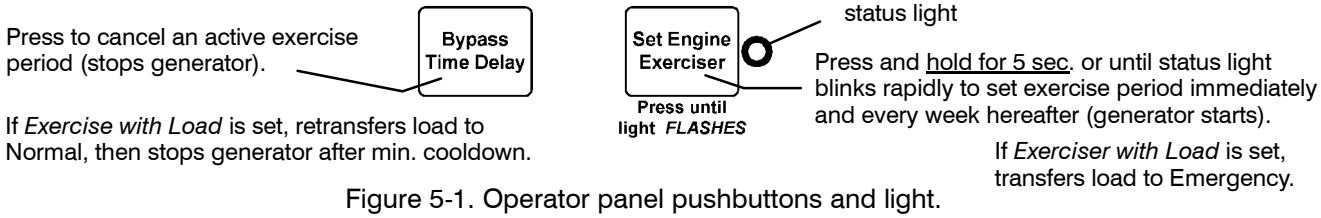


Figure 5-1. Operator panel pushbuttons and light.

Select below either *Exercise without Load* or *Exercise with Load* according to the setting of DIP switch S1, actuator 8. The load transfers from the Normal source to Emergency source (generator) and back again if *Exercise with Load* is selected.

Exercise without Load, DIP Switch S1, Actuator 8 off (8) How to Set Built–In Timer

Step	Push Button	Status Light	Function	Explanation
1	*SET ENGINE EXERCISER* hold 5 sec.	blinks rapidly ●○●○●○	set exercise period	Exercise the generator now and every week at this time hereafter.
2	release	blinks slowly ●○○●○○	exercise period now active	Generator starts and runs.
3	press *BYPASS TIME DELAY*	● stays on	cancel active exercise period	Generator stops.
4	—	● stays on	generator off	Exerciser enabled; repeats every 7 days.

Exercise with Load, DIP Switch S1, Actuator 8 on (8) How to Set Built–In Timer

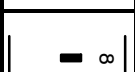
Step	Push Button	Status Light	Function	Explanation
1	*SET ENGINE EXERCISER* hold 5 sec.	blinks rapidly ●○●○●○	set exercise period	Exercise the generator now and every week at this time hereafter.
2	release	blinks slowly ●○○●○○	exercise period now active	Generator starts and runs; the load transfers to Emergency.
3	press *BYPASS TIME DELAY*	blinks slowly ●○○●○○	cancel active exercise period	The load retransfers to Normal; then generator runs for 5 minute cooldown (light blinks slowly during cooldown).
4	—	● stays on	generator off	Exerciser enabled; repeats every 7 days.

NOTE: Every time *SET ENGINE EXERCISER* push button is pressed (held 5 seconds) the exercise period is changed.

OPTIONAL PROGRAMMABLE ENGINE EXERCISER (Accessory 11CD)

The optional programmable engine exerciser provides seven days of different exercise periods. The timer is connected and mounted below the controller. A permanent backup battery maintains the setting; when power is lost to timer, output switch deenergizes.

DIP Switch Settings

FUNCTION	S1 DIP SWITCH		S2 DIP SWITCH	
Opt. Timer Enabled	Actuator 7 off		Actuator 5 off	
Opt. Timer Disabled	Actuator 7 off		Actuator 5 on	
Exercise without Load	Actuator 8 off			
Exercise with Load	Actuator 8 on			

☐ Shaded DIP switches are standard factory settings.

The Accessory 11CD Programmable Engine Exerciser incorporates a 7 day time base, and therefore, each day of the week can be uniquely programmed to test the engine generator set either with or without load. The proper controller settings must be made to determine whether or not the test will be conducted with or without load (refer to page 5–1 for proper selection). For convenience, Block Programming is also provided, whereby up to seven days can be grouped together if the *ON* and *OFF* times are the same.

See next page for instructions on setting the timer. ☞

How to Set Optional Programmable Engine Exerciser (Accessory 11CD)

⚠ WARNING

Proceed with care! The automatic transfer switching equipment is energized.

Setting the Clock (Time and Day)

Step	Press Button	Display	Meaning
1	**reset**	1234567 (blink) 00 00 ⊙ ○	after self-test, clears memory
2 ↓ Note	hold **h**, then press **±1h**	1 2 3 4 5 6 7 AM 12 00 ⊙ ○	military 24 hr or AM/PM 12 hr time
	Repeat step 2 to toggle between military (blank display) and AM/PM time.		
3	hold ⊙ (clock symbol)	1234567 (blink) 00 00 ⊙ ○	hold ⊙ while setting thru step 7
4	**±1h** once (if Daylight Saving Time)	±1h	do nothing if it is Standard Time.
5	**h** (hold for fast count)	[00] 00	hour
6	**m** (hold for fast count)	00 [00]	minute
7	**Day**	Mo Tu We Th Fr Sa Su	day
8	release ⊙	: blinking	time & date set, clock starts

Programming Engine On-Off Period(s)

Step	Press Button	Display	Meaning
1	**Prog.** (do not hold)	1 2 3 4 5 6 7 — : —	begin
2	**hand**	⊙	on
3	**h**	start hour	start engine
4	**m**	start minute	
5	**Day**	start day	
Note	Successive pressing displays blocks of days: Mon–Sat, Mon–Fri, Sat & Sun (1 is Monday)		
6	**Prog.**	1 2 3 4 5 6 7 — : —	begin
7	Press **hand** (2 times)	○	off
8	**h**	stop hour	stop engine
9	**m**	stop minute	
10	**Day**	stop day	
11	⊙	: blinking	program set

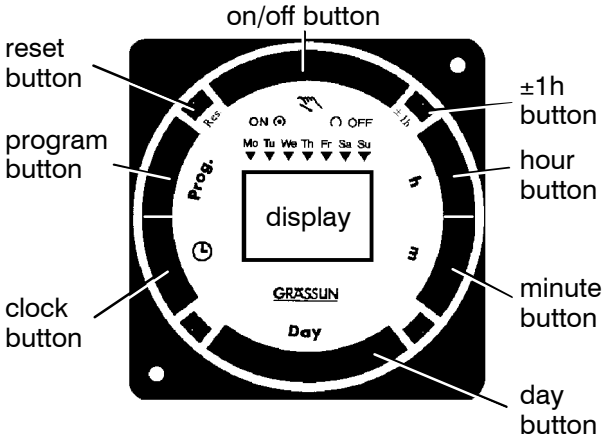


Figure 5-2. Exerciser display and push buttons

Changing or Checking Time Programs

By operating the *Prog.* button, the individual commands as programmed can, at any time, be brought consecutively into the display for revision or checking. Revisions are accomplished by programming over the existing programs using the steps at the left.

Canceling Time Programs

After the selecting the desired program, use the *h* and *m* buttons to set hours and minutes to zero; the —:— will be displayed. This program has been made ineffective and will no longer be carried out. To cancel all programs, press the *Res. (reset)* button. This clears all memory including the time base and program storage.

Manual Override

⚠ WARNING

Do not manually override the exerciser unless you are sure that the controller has been set for exercise without load (see page 5–2). Failure to do so could result in possible injury if the transfer switch operates while the enclosure door is open.

Step	Press Button	Display	Meaning
1	**hand**	⊙ hand	on
2	**hand**	[⊙]	permanent on
3	**hand**	[○]	permanent off
4	**hand**	⊙ ○	back to automatic

Daylight Savings / Standard Time Change

To change to Daylight Savings time (Summer time), press the ±*1h* button once. Clock advances by one hour and **+1h** appears in display.

To change to Standard Time (Greenwich mean time in UK, Middle European time in Germany), press the ±*1h* button again; the clock sets back one hour and **+1h** disappears.

CONTROL FEATURES *(continued)*

INPHASE MONITOR FOR MOTOR LOAD TRANSFER

Inphase monitoring logic controls transfer and retransfer of motor loads, so that inrush currents do not exceed normal starting currents. It avoids nuisance tripping of circuit breakers and mechanical damage to motor couplings.

The Motor Load Transfer feature is built into the controller. DIP switch S1 (actuator 5) activates this feature: right = ON, left = OFF.

FUNCTION	S1 DIP SWITCH	
enable	Actuator 5 on	
disable	Actuator 5 off	

☐ Shaded DIP switches are standard factory settings.

Note

If the Motor Load Transfer feature is enabled, it will be activated following the Load Disconnect Feature Delay Before Transfer delay.

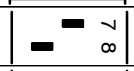
LOAD DISCONNECT FEATURE

Connect external circuits to the terminals indicated on the Wiring Diagram provided with the ATSE.

The double throw (Form C) contact is rated for 28 VDC or 120 VAC (5 amps resistive). The contact operates prior to a selectable 0, 3, 10, or 20 second delay before transfer of the automatic transfer switching device. The contact resets either immediately following transfer or after the same delay as set for pre–signal before transfer.

Time delay between the load disconnect control signal and initiation of transfer is set on the controller with DIP switch S2 (actuators 6, 7, 8) as shown below:

Delay Before Transfer

LD TDBT	S2 DIP SWITCH	
0 (disable)	Actuator 7 on Actuator 8 on	
3 seconds	Actuator 7 on Actuator 8 off	
10 seconds	Actuator 7 off Actuator 8 on	
20 seconds	Actuator 7 off Actuator 8 off	

☐ Shaded DIP switches are standard factory settings.

Delay After Transfer*

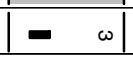
LD TDAT	S2 DIP SWITCH	
enable	Actuator 6 on	
disable	Actuator 6 off	

*Enabling the Delay After Transfer will cause the control signal to reset after the same delay as set for the Delay Before Transfer.

REMOTE CONTROL FEATURES

These remote control features require a customer–supplied normally closed contact suitable for a 5 V dc low energy circuit. Refer to the Wiring Diagram provided with the ATS. Activate appropriate DIP switch S2 actuators below.

Remote Test (terminals CP6–7)

RTSW	S2 DIP SWITCH	
disable	Actuator 3 on	
enable	Actuator 3 off	

Remote Transfer to Emergency (CP8–9)

RT /E	S2 DIP SWITCH	
disable	Actuator 2 on	
enable	Actuator 2 off	

Bypass Transfer Time Delay (CP12–13)

TD E/N BYP.	S2 DIP SWITCH	
disable	Actuator 1 on	
enable	Actuator 1 off	

Inhibit Transfer to Emergency (CP10–11)

N/E INHIB.	S2 DIP SWITCH	
disable	Actuator 4 on	
enable	Actuator 4 off	

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